

JVC

SERVICE MANUAL

COLOR TELEVISION

AV-20420/SA,
AV-20421/SA

BASIC CHASSIS

FV5

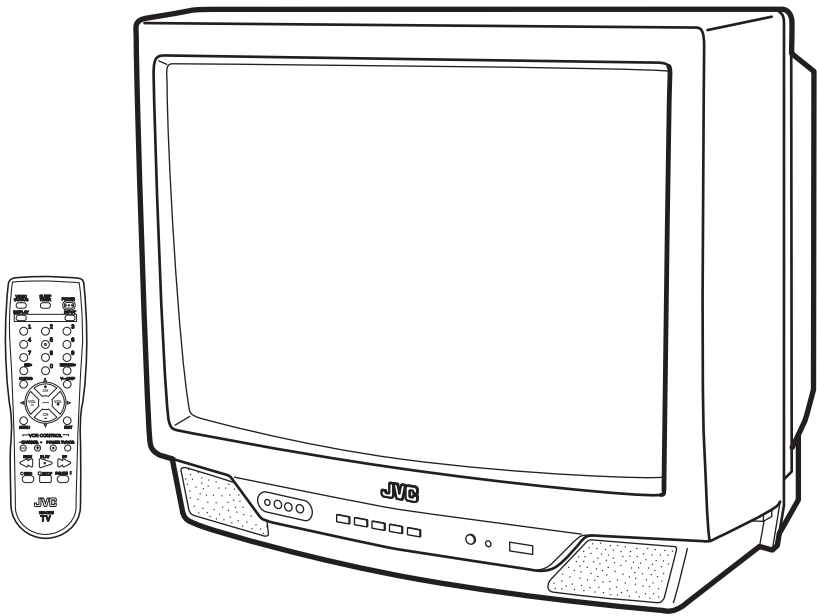


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SPECIFICATION

Items	Contents
Dimensions (W x H x D)	50.3cm x 45.2cm x 49.3cm (19-7/8" x 17-7/8" x 19-1/2")
Mass	19.9 kg (43.8 lbs)
TV RF System	CCIR(M)
Color Sound System	NTSC, BTSC system (Multi Channel Sound)
TV Receiving Channels and Frequency	VHF LOW 02ch~06ch : 54MHz~88MHz VHF HIGH 07ch~13ch : 174MHz~216MHz UHF 14ch~69ch : 470MHz~806MHz CATV 54MHz~804MHz Low Band : 02~06, A-8 by 02~06&01 High Band : 07~13 by 07~13 Mid Band : A~1 by 14~22 Super Band : J~W by 23~36 Hyper Band : W+1~W+28 by 37~64 Ultra Band : W+29~W+84 by 65~125 Sub Mid Band : A8, A4~A1 by 01, 96~99
TV/CATV Total Channel	180 channels
Intermediate Frequency	Video IF Carrier 45.75MHz Sound IF Carrier 41.25MHz (4.5MHz)
Color Sub Carrier	3.58MHz
Power Input	AC 120V, 60Hz
Power Consumption	87W
Picture Tube	20" (51cm) measured diagonally H : 40.6cm x V : 30.5cm
High Voltage	26.5kV±1kV (at zero beam current)
Speaker	5 x 9cm (2" x 3-1/2") Oval type x 2
Audio Power Output	1W+1W
Antenna Terminal (VHF/UHF)	F-type connector, 75ohm
Video / Audio Input (1 / 2 / 3)	Video (1 / 3) 1V(p-p), 75ohm (RCA pin jack x 2) Audio (1 / 2 / 3) 500mV(rms) (-4dBs), high Impedance (RCA pin jack x 8) S-Video (1) Mini DIN 4pin x 1 Y : 1V(p-p) positive (negative sync provided, when terminated with 75ohm) C : 0.286V(p-p) (burst signal when terminated with 75ohm) Component (2) RCA pin jack x 3 Y : 1V(p-p) positive (negative sync provided, when terminated with 75ohm) Pb/Pr : 0.7V(p-p) 75ohm
Audio Output (Variable)	More then 0~1550mV(rms) (+6dBs) low impedance (400Hz when modulated 100%) (RCA pin jack x 2)
Headphone Jack	3.5mm mini jack x 1
Remote Control Unit	RM-C205 (AA/R6/UM-3 battery x 2) [AV-20420] RM-C205W (AA/R6/UM-3 battery x 2) [AV-20421]

Design & specifications are subject to change without notice.

SECTION 1 PRECAUTIONS

1.1 SAFETY PRECAUTIONS

- (1) The design of this product contains special hardware, many circuits and components specially for safety purposes. For continued protection, no changes should be made to the original design unless authorized in writing by the manufacturer. Replacement parts must be identical to those used in the original circuits. Service should be performed by qualified personnel only.
- (2) Alterations of the design or circuitry of the products should not be made. Any design alterations or additions will void the manufacturer's warranty and will further relieve the manufacturer of responsibility for personal injury or property damage resulting therefrom.
- (3) Many electrical and mechanical parts in the products have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts that have these special safety characteristics are identified in the parts list of Service manual. **Electrical components having such features are identified by shading on the schematics and by (Δ) on the parts list in Service manual.** The use of a substitute replacement which does not have the same safety characteristics as the recommended replacement part shown in the parts list of Service manual may cause shock, fire, or other hazards.
- (4) **Use isolation transformer when hot chassis.**
The chassis and any sub-chassis contained in some products are connected to one side of the AC power line. An isolation transformer of adequate capacity should be inserted between the product and the AC power supply point while performing any service on some products when the HOT chassis is exposed.
- (5) **Don't short between the LIVE side ground and ISOLATED (NEUTRAL) side ground or EARTH side ground when repairing.** Some model's power circuit is partly different in the GND. The difference of the GND is shown by the LIVE : (⊥) side GND, the ISOLATED(NEUTRAL) : (↗) side GND and EARTH : (⊕) side GND. Don't short between the LIVE side GND and ISOLATED(NEUTRAL) side GND or EARTH side GND and never measure with a measuring apparatus (oscilloscope etc.) the LIVE side GND and ISOLATED(NEUTRAL) side GND or EARTH side GND at the same time.
If above note will not be kept, a fuse or any parts will be broken.
- (6) The high voltage applied to the picture tube must conform with that specified in Service manual. Excessive high voltage can cause an increase in X-Ray emission, arcing and possible component damage, therefore operation under excessive high voltage conditions should be kept to a minimum, or should be prevented. If severe arcing occurs, remove the AC power immediately and determine the cause by visual inspection (incorrect installation, cracked or melted high voltage harness, poor soldering, etc.). To maintain the proper minimum level of soft X-Ray emission, components in the high voltage circuitry including the picture tube must be the exact replacements or alternatives approved by the manufacturer of the complete product.
- (7) If any repair has been made to the chassis, it is recommended that the B1 setting should be checked or adjusted (See ADJUSTMENT OF B1 POWER SUPPLY).
- (8) Do not check high voltage by drawing an arc. Use a high voltage meter or a high voltage probe with a VTVM. Discharge the picture tube before attempting meter connection, by connecting a clip lead to the ground frame and connecting the other end of the lead through a 10kΩ 2W resistor to the anode button.
- (9) When service is required, observe the original lead dress. Extra precaution should be given to assure correct lead dress in the high voltage circuit area. Where a short circuit has occurred, those components that indicate evidence of overheating should be replaced. Always use the manufacturer's replacement components.

(10) Isolation Check

(Safety for Electrical Shock Hazard) After re-assembling the product, always perform an isolation check on the exposed metal parts of the cabinet (antenna terminals, video/audio input and output terminals, Control knobs, metal cabinet, screwheads, earphone jack, control shafts, etc.) to be sure the product is safe to operate without danger of electrical shock.

a) Dielectric Strength Test

The isolation between the AC primary circuit and all metal parts exposed to the user, particularly any exposed metal part having a return path to the chassis should withstand a voltage of 1100V AC (r.m.s.) for a period of one second.

(. . . Withstand a voltage of 1100V AC (r.m.s.) to an appliance rated up to 120V, and 3000V AC (r.m.s.) to an appliance rated 200V or more, for a period of one second.)

This method of test requires test equipment not generally found in the service trade.

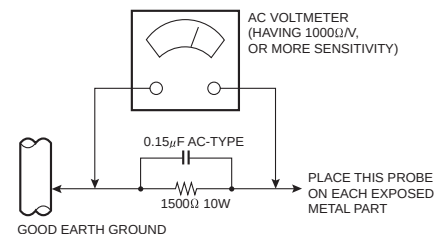
b) Leakage Current Check

Plug the AC line cord directly into the AC outlet (do not use a line isolation transformer during this check.). Using a "Leakage Current Tester", measure the leakage current from each exposed metal part of the cabinet, particularly any exposed metal part having a return path to the chassis, to a known good earth ground (water pipe, etc.). Any leakage current must not exceed 0.5mA AC (r.m.s.). However, in tropical area, this must not exceed 0.2mA AC (r.m.s.).

• Alternate Check Method

Plug the AC line cord directly into the AC outlet (do not use a line isolation transformer during this check.). Use an AC voltmeter having 1000 ohms per volt or more sensitivity in the following manner. Connect a 1500ohm 10W resistor paralleled by a 0.15μF AC-type capacitor between an exposed metal part and a known good earth ground (water pipe, etc.). Measure the AC voltage across the resistor with the AC voltmeter. Move the resistor connection to each exposed metal part, particularly any exposed metal part having a return path to the chassis, and measure the AC voltage across the resistor. Now, reverse the plug in the AC outlet and repeat each measurement. Any voltage measured must not exceed 0.75V AC (r.m.s.). This corresponds to 0.5mA AC (r.m.s.).

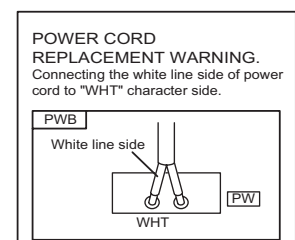
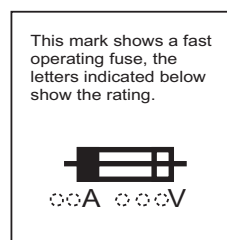
However, in tropical area, this must not exceed 0.3V AC (r.m.s.). This corresponds to 0.2mA AC (r.m.s.).



(11) High voltage hold down circuit check.

After repair of the high voltage hold down circuit, this circuit shall be checked to operate correctly.

See item "How to check the high voltage hold down circuit".



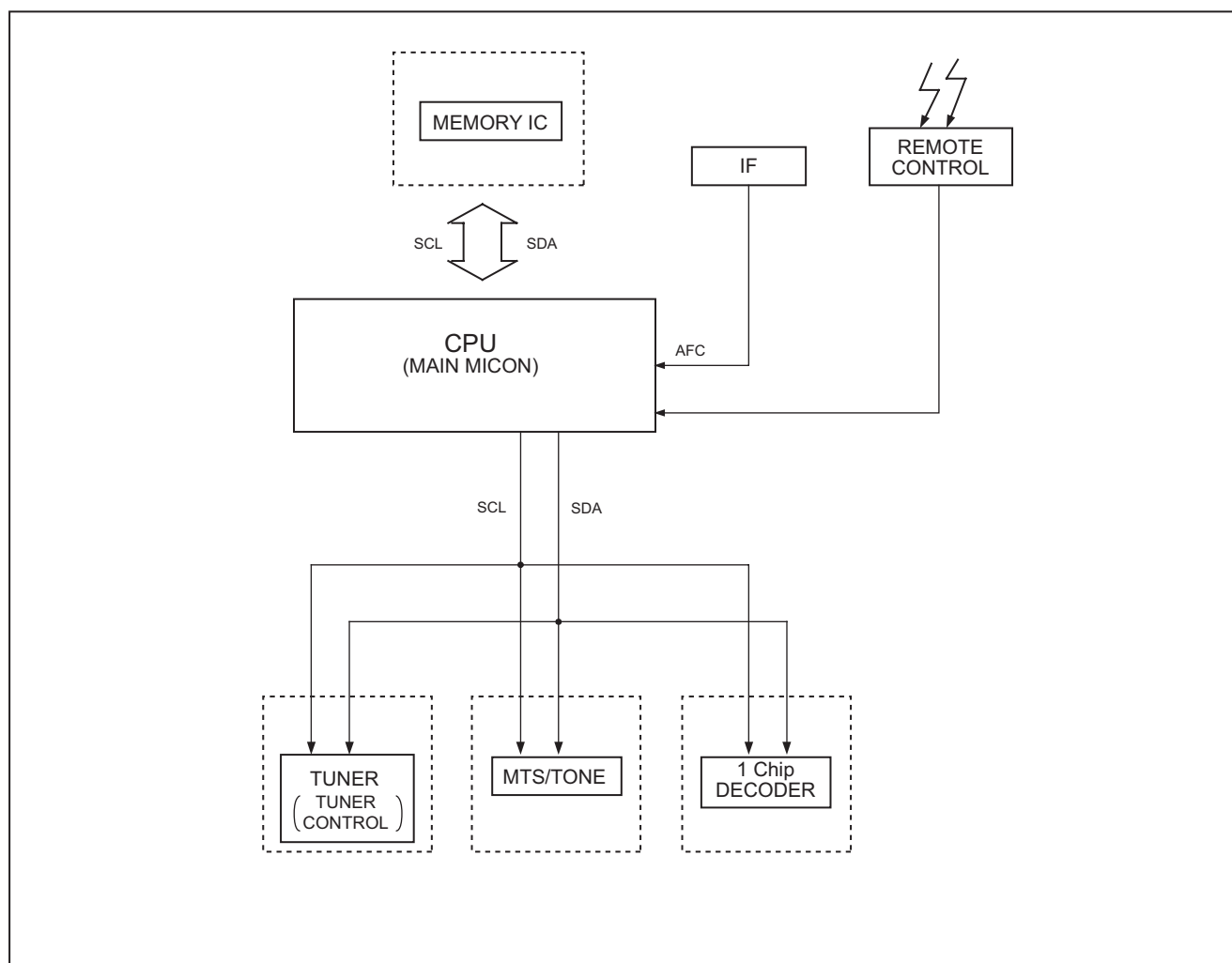
SECTION 2

SPECIFIC SERVICE INSTRUCTIONS

2.1 FEATURES

- New chassis design enables use of a single board with simplified circuitry.
- Provided with miniature tuner (TV/CATV).
- Multifunctional remote control permits picture adjustment.
- Adoption of the CHANNEL GUARD function prevents the specific channels from being selected, unless the "ID number" is key in.
- I2C bus control utilizes single chip IC.
- Adoption of the VIDEO STATUS function.
- Adoption of the ON/OFF TIMER function.
- With 75ohm V/U in common (F-Type) ANT Terminal.
- SLEEP TIMER for setting in real time.
- Closed-caption broadcasts can be viewed.
- Audio Video input terminal.
- Variable Audio output terminal.
- Built-in MTS system.

2.2 SYSTEM BLOCK DIAGRAM



2.3 MAIN DIFFERENCE LIST

⚠	Parts Name	AV-20420	AV-20421
	BODY COLOR	BLACK	WHITE
⚠	FRONT CABINET	LC10109-016A-A	LC10109-017A-A
⚠	POWER KNOB	LC30376-001A-A	LC30376-002A-A
⚠	PUSH KNOB	LC30271-001A-A	LC30271-002A-A
⚠	REAR COVER	LC10108-006A-A	LC10108-007A-A
⚠	POWER CORD CLAMP	LC20106-001D-A	LC20106-002C-A
	REMOTE CONTROL UNIT	RM-C205-1C	RM-C205W-1C
	WHITE MARK (PACKING CASE)	not used	GQ40012-001A-A

2.4 DISASSEMBLY PROCEDURE

2.4.1 REMOVING THE REAR COVER

- (1) Unplug the power plug.
- (2) Remove the 5 screws [A], and 2 screws [B] as shown in Fig.1.
- (3) Withdraw the REAR COVER toward you..

CAUTION:

When reinstalling the rear cover, carefully push it inward after inserting the MAIN PWB into the rear cover groove.

2.4.2 REMOVING THE MAIN PWB

- Remove the REAR COVER.
 - (1) Raise the backside of the MAIN PWB slightly. And remove the PWB STOPPER [C] from the cabinet bottom.
 - (2) Withdraw the MAIN PWB backward.
(If necessary, remove the wire clamp and connectors, etc.)

2.4.3 REMOVING THE SPEAKER

- Remove the MAIN PW board.
 - (1) Remove the 2 screws [D].
 - (2) Then you can remove the SPEAKER.

2.4.4 CHECKING THE MAIN PW BOARD

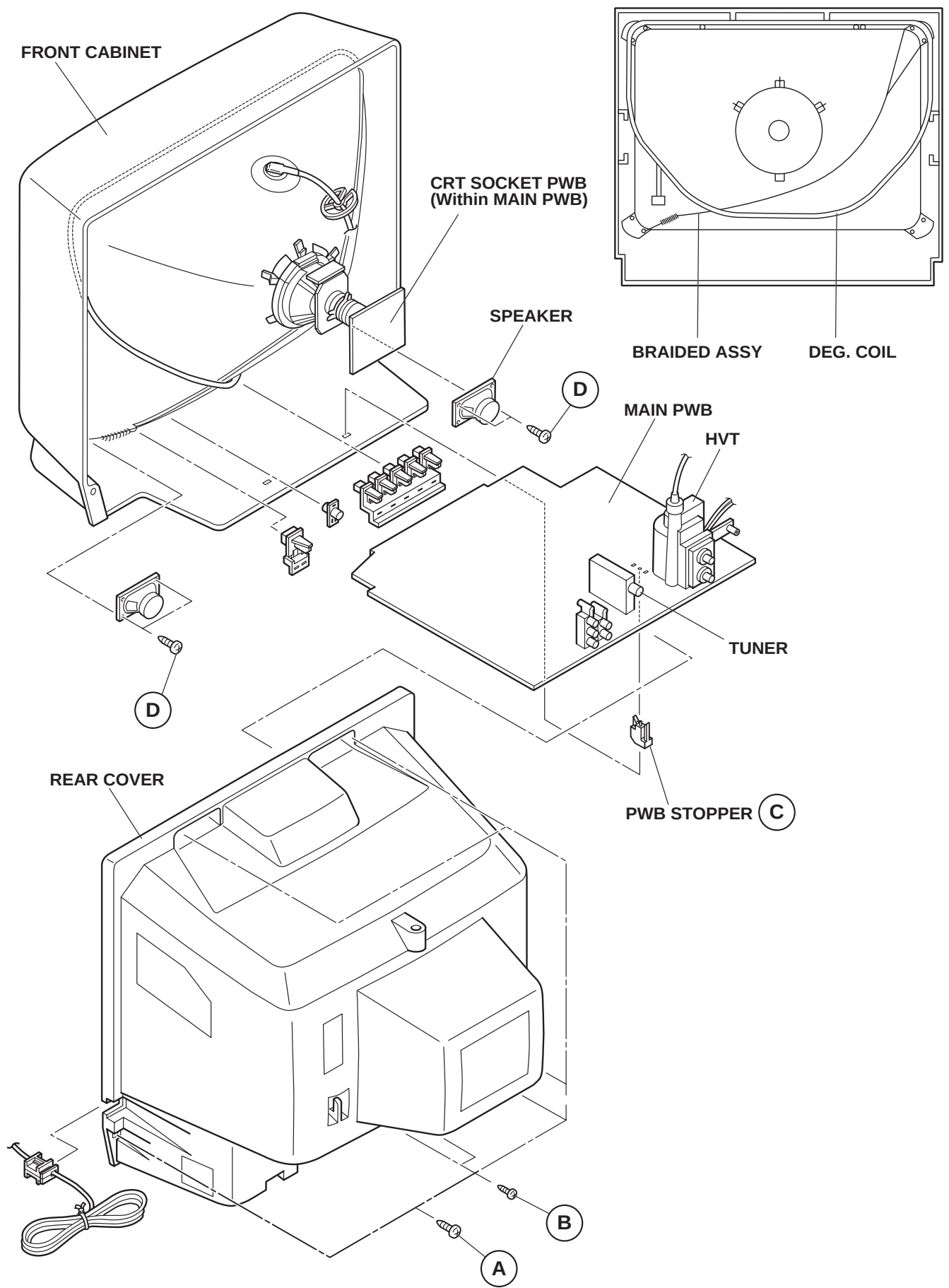
- (1) Pull out the MAIN CHASSIS (refer to REMOVING THE MAIN PWB).
- (2) Erect the chassis vertically so that you can easily check the MAIN PWB from the reverse (solder) side.

CAUTION:

- When erecting the MAIN PWB, be careful so that there will be no contacting with other PWB.
- Before turning power on, make sure that the CRT earth wire and other connectors are properly connected.
- When conducting a check with power supplied, be sure to confirm that the CRT EARTH WIRE (BRAIDED ASS'Y) is connected to the CRT SOCKET PWB.

2.4.5 WIRE CLAMPING AND CABLE TYING

- (1) Be sure to clamp the wire.
- (2) Never remove the cable tie used for tying the wires together.
Should it be inadvertently removed, be sure to tie the wires with a new cable tie.



2.5 REPLACEMENT OF MEMORY IC

2.5.1 MEMORY IC

This TV use memory IC.
In the memory IC, there are memorized data for correctly operating the video and deflection circuits.
When replacing the memory IC, be sure to use IC written with the initial values of data.

2.5.2 PROCEDURE FOR REPLACING MEMORY IC

(1) Power off

Switch the power off and unplug the power plug.

(2) Replace IC

Be sure to use a memory IC written with the initial setting data.

(3) Power on

Connect the power plug and switch the power on.

(4) Setting of receive channels

Set the receive channels. For setting, refer to the OPERATING INSTRUCTIONS.

(5) User settings

Check the user setting items according to TABLE “USER SETTING VALUE”, and if these are different, set the correct value.

(6) CHECK THE SYSTEM CONSTANT ITEMS

If the value of each item of a system setup is not correctly set as a value peculiar to this television, operation of a microcomputer and the output of an image do not become suitable. Please set up the value of each item correctly, according to the following description.

- (1) Press the [SLEEP TIMER] key, and while the indication of “SLEEP TIMER 0 MIN” is being displayed, press [DISPLAY] key and [VIDEO STATUS] key on the remote control unit simultaneously (Fig.1).
- (2) The SERVICE MENU screen of Fig.1 will be displayed.
- (3) While the SERVICE MENU is displayed, again simultaneously press the [DISPLAY] and [VIDEO STATUS] keys to display the SYSTEM CONSTANT screen (Fig.2).
- (4) Refer to the Table 1 of SYSTEM CONSTANT SETTING, and check the setting items. Where these differ, select the item with the [CH (-/+)] key and adjust it with the [VOL (-/+)] keys (The letters of the selected item are displayed in yellow).
- (5) The setting value will be stored automatically when release the remote control unit keys.
- (6) Press the [EXIT] key twice to return to the normal screen.

(7) SERVICE MENU setting

Verify what to set in the SERVICE MENU, and set whatever is necessary. Refer to the SECTION 3 ADJUSTMENT for setting.

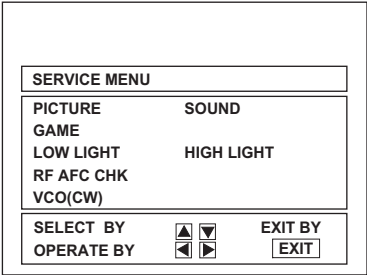


Fig.1

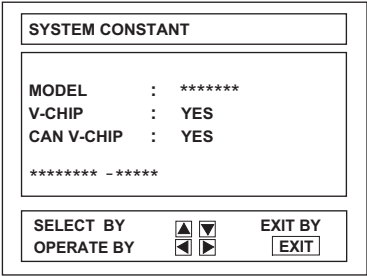


Fig.2

2.5.3 SYSTEM CONSTANT SETTING

Setting Item	Setting Content	AV-20420/SA	AV-20421/SA
MODEL		AV-20220	AV-20220
V-CHIP		YES	YES
CAN V-CHIP		YES	YES

2.5.4 USER SETTING VALUE

Setting item	Setting value
1. Use remote controller keys	
POWER	Off
CHANNEL	CH 02
CHANNEL PRESET	See OPERATING INSTRUCTIONS.
VOLUME	10
INPUT (TV/VIDEO)	TV
DISPLAY	Off
SLEEP TIMER	0
VIDEO STATUS	STANDARD
2. Setting of MENU	
TINT	Center
COLOR	Center
PICTURE	Center
BRIGHT	Center
DETAIL	Center
BASS	Center
TREBLE	Center
BALANCE	Center
MTS	STEREO
TV SPEAKER	ON
NOISE MUTING	ON
SET VIDEO STATUS	All center
SET CLOCK	Unnecessary to set
ON/OFF TIMER	OFF
LANGUAGE	ENG
CLOSED CAPTION	OFF
BACKGROUND	BLACK
AUTO TUNER SETUP	TUNER MODE : AIR
CHANNEL SUMMARY	Unnecessary to set
V-CHIP	OFF
SET LOCK CODE	Unnecessary to set

2.5.5 SERVICE MENU SETTING ITEM

Menu item	Setting item	Menu item	Setting item
PICTURE	1. BRIGHT	GAME	TINT
	2. PICTURE		COLOR
	3. TV DETAIL		PICTURE
	4. TV BPF		BRIGHT
	5. TINT		DETAIL
	6. COLOR	LOW LIGHT	RED
	7. EXT BRIGHT		GREEN
	8. EXT PICTURE		BLUE
	9. EXT DETAIL	HIGH LIGHT	GREEN
	10. EXT BPF		BLUE
	11. EXT TINT	RF AFC CHECK [Do not adjust]	RF AFC
	12. EXT COLOR		FINE
	13. V SIZE		STATUS
	14. V CENTER	VCO(CW)	Refer to “ADJUSTMENTS PROCEDURE”
	15. H POSITION		
	16. OSD H POSITION		
	17. OSD V POSITION		
	18. H AFC		
	19. RF AGC		
	20. OSD SELECT		
SOUND	1. IN LEVEL		
	2. FH MON		
	3. ST VCO		
	4. PILOT		
	5. FILTER		
	6. LOW SEP		
	7. HIGH SEP		
	8. 5FH MON		
	9. SAP VCO		
	10. FIL OFF		

2.6 REPLACEMENT OF CHIP COMPONENT

2.6.1 CAUTIONS

- (1) Avoid heating for more than 3 seconds.
- (2) Do not rub the electrodes and the resist parts of the pattern.
- (3) When removing a chip part, melt the solder adequately.
- (4) Do not reuse a chip part after removing it.

2.6.2 SOLDERING IRON

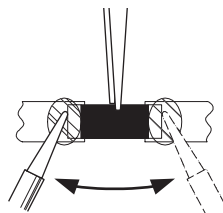
- (1) Use a high insulation soldering iron with a thin pointed end of it.
- (2) A 30w soldering iron is recommended for easily removing parts.

2.6.3 REPLACEMENT STEPS

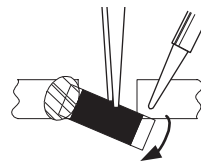
1. How to remove Chip parts

[Resistors, capacitors, etc.]

- (1) As shown in the figure, push the part with tweezers and alternately melt the solder at each end.



- (2) Shift with the tweezers and remove the chip part.

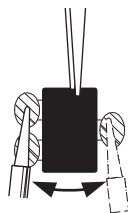


[Transistors, diodes, variable resistors, etc.]

- (1) Apply extra solder to each lead.



- (2) As shown in the figure, push the part with tweezers and alternately melt the solder at each lead. Shift and remove the chip part.



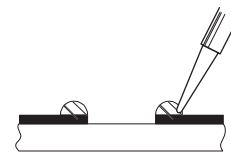
Note :

After removing the part, remove remaining solder from the pattern.

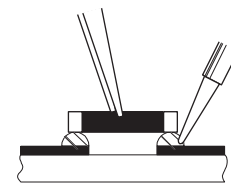
2. How to install Chip parts

[Resistors, capacitors, etc.]

- (1) Apply solder to the pattern as indicated in the figure.

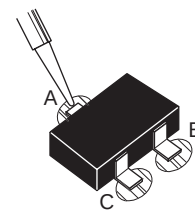


- (2) Grasp the chip part with tweezers and place it on the solder. Then heat and melt the solder at both ends of the chip part.

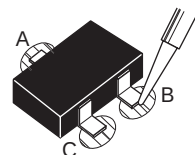


[Transistors, diodes, variable resistors, etc.]

- (1) Apply solder to the pattern as indicated in the figure.
- (2) Grasp the chip part with tweezers and place it on the solder.
- (3) First solder lead **A** as indicated in the figure.



- (4) Then solder leads **B** and **C**.



SECTION 3 ADJUSTMENT

3.1 ADJUSTMENT PREPARATION

- (1) There are 2 ways of adjusting this TV : One is with the REMOTE CONTROL UNIT and the other is the conventional method using adjustment parts and components.
- (2) The adjustment using the REMOTE CONTROL UNIT is made on the basis of the initial setting values. The setting values which adjust the screen to the optimum condition can be different from the initial setting values.
- (3) Make sure that connection is correctly made AC to AC power source.
- (4) Turn on the power of the TV and measuring instruments for warming up for at least 30 minutes before starting adjustments.
- (5) If the receive or input signal is not specified, use the most appropriate signal for adjustment.
- (6) Never touch the parts (such as variable resistors, transformers and condensers) not shown in the adjustment items of this service adjustment.
- (7) Preparation for adjustment. Unless otherwise specified in the adjustment items, preset the following functions with the REMOTE CONTROL UNIT.

Setting item	Setting value
VIDEO STATUS	STANDARD
BASS/TREBLE/BALANCE	Center
TINT / COLOUR / PICTURE / BRIGHT / DETAIL	Center
MTS	STEREO

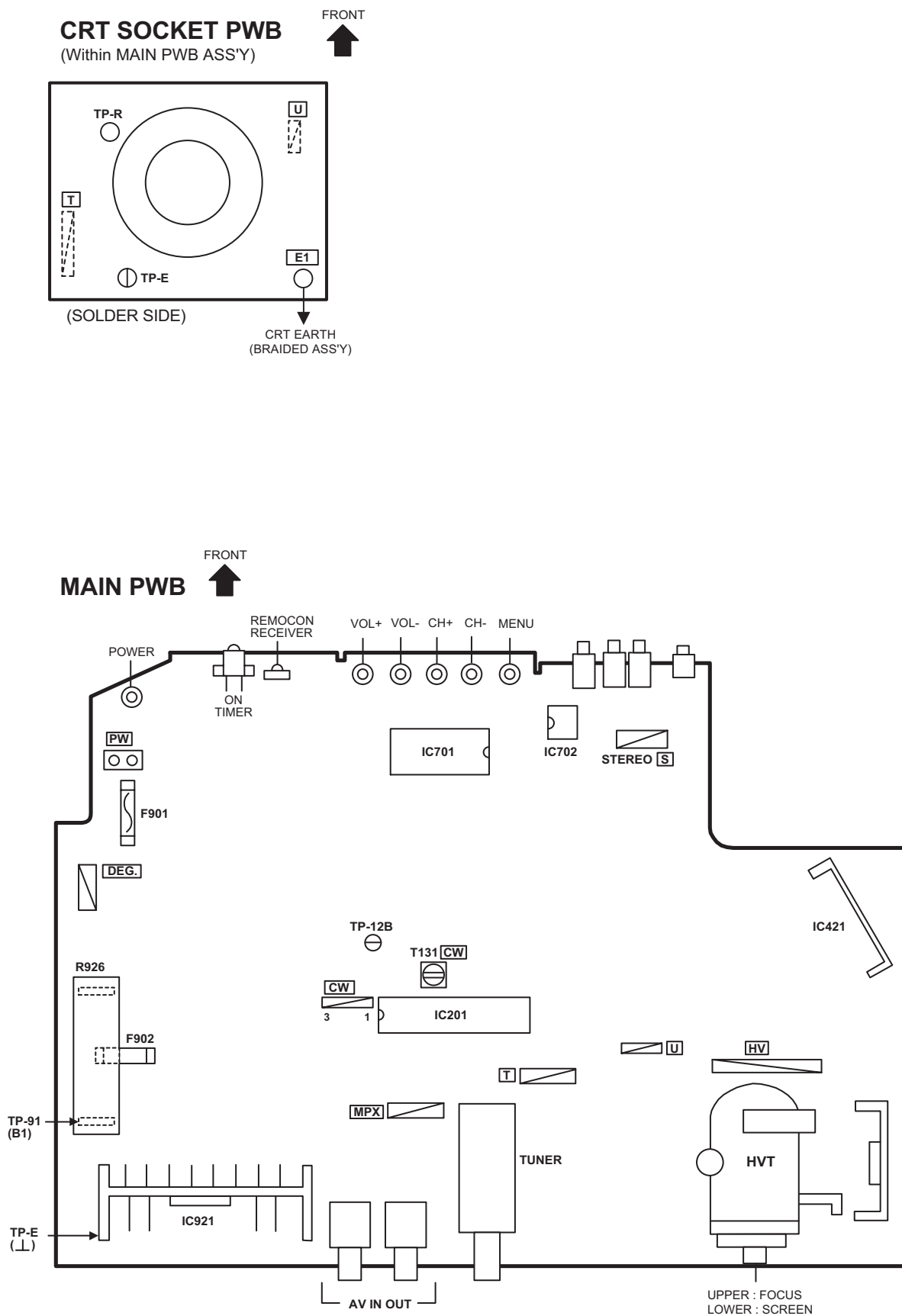
3.2 MEASURING INSTRUMENT AND FIXTURES

- DC voltmeter (or digital voltmeter)
- Oscilloscope
- Frequency counter
- Signal generator (Pattern generator : NTSC)
- TV audio multiplex signal generator
- Remote control unit

3.3 ADJUSTMENT ITEMS

- **B1 POWER SUPPLY VOLTAGE CHECK**
- **TUNER CIRCUIT / FOCUS**
 - IF VCO ADJUSTMENT
 - RF AGC ADJUSTMENT
 - FOCUS ADJUSTMENT
- **DEFLECTION CIRCUIT**
 - V SIZE ADJUSTMENT
 - H POSITION ADJUSTMENT
- **WHITE BALANCE**
 - LOW LIGHT ADJUSTMENT
 - HIGH LIGHT ADJUSTMENT
- **VIDEO CIRCUIT**
 - SUB BRIGHT ADJUSTMENT
 - SUB CONTRAST ADJUSTMENT
 - SUB COLOR ADJUSTMENT
 - SUB TINT ADJUSTMENT
- **MTS CIRCUIT**
 - INPUT LEVEL ADJUSTMENT
 - STEREO VCO ADJUSTMENT
 - SAP VCO ADJUSTMENT
 - FILTER CHECK
 - SEPARATION ADJUSTMENT
- **PURITY / CONVERGENCE**
 - PURITY ADJUSTMENT
 - STATIC CONVERGENCE ADJUSTMENT
 - DYNAMIC CONVERGENCE ADJUSTMENT
- **HIGH VOLTAGE HOLD DOWN CIRCUIT CHECK**

3.4 ADJUSTMENT LOCATIONS



3.5 BASIC OPERATION OF SERVICE MENU

3.5.1 TOOL OF SERVICE MENU OPERATION

Operate the SERVICE MENU with the REMOTE CONTROL UNIT.

3.5.2 SERVICE MENU ITEMS

With the SERVICE MENU, various adjustments can be made, and they are broadly classified in the following items of settings.

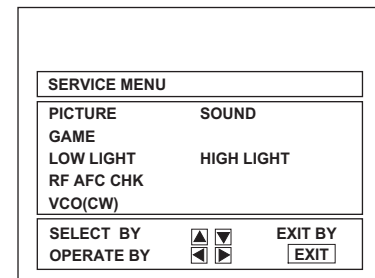
PICTURE	This mode adjusts the VIDEO CHROMA and DEFLECTION control circuit.
SOUND	This mode adjusts the SOUND control circuit.
GAME	This mode adjusts the detailed GAME mode settings.
LOW LIGHT	This mode adjusts the WHITE BALANCE (LOW LIGHT) control circuit.
HIGH LIGHT	This mode adjusts the WHITE BALANCE (HIGH LIGHT) control circuit.
RF AFC CHECK	This is no requirement for adjustment. Do not adjust this mode.
VCO(CW)	This mode adjusts the VCO control circuit.

3.5.3 BASIC OPERATION IN SERVICE MENU

(1) HOW TO ENTER THE SERVICE MENU

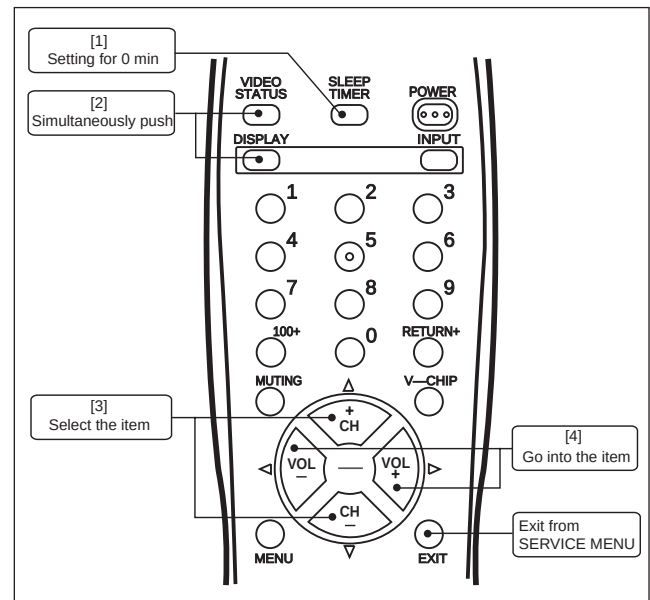
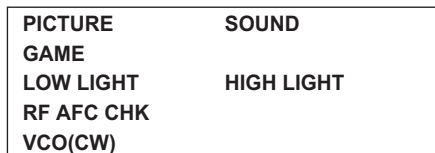
Press the [SLEEP TIMER] key and set the SLEEP TIMER for "0 MIN".

Then press the [DISPLAY] key and [VIDEO STATUS] key of the remote control unit at the same time to enter the SERVICE MENU screen. The SERVICE MENU screen will be shown.



(2) SUB MENU SCREEN SELECTION

Press [CHANNEL (-/+)] keys of the REMOTE CONTROL UNIT, and select the sub menu screen from SERVICE MENU. In SERVICE MENU, press the [CHANNEL (-/+)] key to select any of the sub menu items. The letters of the selected items are displayed in yellow.



(3) SETTING METHOD

[PICTURE AND SOUND ADJUSTMENT MODE]

- (1) If select any of PICTURE or SOUND items, and the [VOLUME (-/+)] key is pressed from SERVICE MENU. The screen [2] will be displayed as shown in figure page later.
- (2) Then [CHANNEL (-/+)] key is pressed, the PICTURE mode screen [3] or the SOUND mode screen [4] will be displayed.
- (3) Press the [CHANNEL (-/+)] keys to select the one of adjustment mode from 1. BRIGHT to 20. OSC SEL, or from 1. IN LEVEL to 10. FIL OFF.
- (4) Press the [VOLUME (-/+)] keys to change the adjustment value. The setting value will be stored automatically when release the REMOTE CONTROL UNIT keys.
It can adjust the items PICTURE and SOUND in the same procedure.

[GAME, LOW LIGHT AND HIGH LIGHT ADJUSTMENT MODE]

If select any of GAME, LOW LIGHT and HIGH LIGHT items, and the [VOLUME (-/+)] key is pressed from SERVICE MENU. The screens [5], [6] or [7] will be displayed as shown in figure page later. Since the key operation in this mode is peculiar, please refer to the clause of the "ADJUSTMENTS PROCEDURE".

[RF AFC CHK ADJUSTMENT MODE]

This is no requirement for adjustment this mode. Don't change these values.

[VCO(CW) ADJUSTMENT MODE]

Since the key operation and screen in this mode is peculiar, please refer to the clause of the "ADJUSTMENTS PROCEDURE".

(4) RELEASE OF SERVICE MENU

When adjustment is completed, press the [EXIT] key twice. Then return to the normal screen.

3.5.4 SERVICE SUB MENU

[1] SERVICE MENU (MAIN MENU)

SERVICE MENU

PICTURE

SOUND

GAME

LOW LIGHT

HIGH LIGHT

RF AFC CHK

VCO(CW)

SELECT BY

OPERATE BY

▲▼

◀▶

EXIT BY

EXIT

[2] SCREEN

SELECT BY

OPERATE BY

▲▼

◀▶

EXIT BY

EXIT

[3] PICTURE MODE

1. BRIGHT

STATUS

SELECT BY

OPERATE BY

▲▼

◀▶

EXIT BY

EXIT

[5] GAME MODE

TINT

COLOR

PICTURE

BRIGHT

DETAIL

SELECT BY

OPERATE BY

▲▼

◀▶

EXIT BY

EXIT

[4] SOUND MODE

1. IN LEVEL

STATUS

SELECT BY

OPERATE BY

▲▼

◀▶

EXIT BY

EXIT

[6] LOW LIGHT MODE

BRIGHT

BRIGHT

◀▶

EXIT BY

EXIT

[7] HIGH LIGHT MODE

HIGH LIGHT

EXIT BY

EXIT

[8] RF AFC CHK MODE
[DO NOT ADJUST]

RF AFC

FINE

STATUS

ON

SELECT BY

OPERATE BY

▲▼

◀▶

EXIT BY

EXIT

[9] VCO (CW) MODE

TOO HIGH

ABOVE REFERENCE

BELOW REFERENCE

TOO LOW

SYNC : YES

EXIT BY

EXIT

3.6 INITIAL SETTING VALUE OF SERVICE MENU

- (1) Adjustment of the SERVICE MENU is made on the basis of the initial setting values; however, the new setting values which set the screen in its optimum condition may differ from the initial setting.
- (2) Do not change the initial setting values of the setting (adjustment) items not listed in "ADJUSTMENTS PROCEDURE".

3.6.1 PICTURE MODE

- The four setting items in the video mode No.7 EXT BRI., No.8 EXT PIC., No.11 EXT TINT and No.12 EXT COL. are linked to the items in the TV MODE No.1 BRIGHT, No.2 PICTURE, No.5 TINT and No.6 COLOR, respectively. When the setting items in the TV mode are adjusted, the values in the setting items in the video mode are revised automatically to the same values in the TV mode (The initial setting values given in () are offset values).
- When the four items (No.7, 8, 11 and 12) are adjusted in the video mode, the setting values in each item are revised independently.

No.	Setting item	Variable range	Initial setting value
1	BRIGHT	0 ~ 127	64
2	PICTURE	0 ~ 127	95
3	TV DTL(TV DETAIL)	0 ~ 63	26
4	TV BPF(TV B.P.FILTER)	0 / 1	0
5	TINT	0 ~ 127	70
6	COLOR	0 ~ 127	48
7	EXT BRI.(EXT.BRIGHT)	±25	(±0)
8	EXT PIC.(EXT.PICTURE)	±25	(±0)
9	EXT DTL(EXT.DETAIL)	0 ~ 63	26
10	EXT BPF(EXT.B.P.FILTER)	0 / 1	0
11	EXT TINT	±25	(+1)
12	EXT COL.(EXT.COLOR)	±25	(+3)
13	V SIZE	0 ~ 63	38
14	V CENT.(V.CENTER)	0 ~ 7	0
15	H POS.(H.POSITION)	0 ~ 31	20
16	OSD HP (OSD H POSITION)	0 ~ 31	26
17	OSD VP (OSD V POSITION)	0 ~ 15	14
18	H. AFC	0 / 1	0
19	RF AGC	0 ~ 63	40
20	OSC SEL	0 / 1	0

3.6.2 SOUND MODE

No.	Setting item	Variable range	Initial setting value
1	IN LEVEL (INPUT LEVEL)	0 ~ 63	14
2	FH MON. (FM MONITOR)	0 / 1	0
3	ST VCO (STEREO VCO)	0 ~ 63	38
4	PILOT (PILOT CANCELER)	0 / 1	0
5	FILTER	0 ~ 63	35
6	LOW SEP. (LOW SEPARATION)	0 ~ 63	10
7	HI SEP. (HI SEPARATION)	0 ~ 63	9
8	5FH MON. (5FH MONITOR)	0 / 1	0
9	SAP VCO	0 ~ 63	40
10	FIL. OFF.	±10	0

3.6.3 GAME MODE

No.	Setting item	Variable range	Initial setting value
1	TINT	±20	0
2	COLOR	±20	0
3	PICTURE	±20	-10
4	BRIGHT	±20	-5
5	DETAIL	±15	5

3.6.4 LOW LIGHT MODE

No.	Setting item	Variable range	Initial setting value
1	R CUTOFF	0 ~ 255	20
2	G CUTOFF	0 ~ 255	20
3	B CUTOFF	0 ~ 255	20

3.6.5 HIGH LIGHT MODE

No.	Setting item	Variable range	Initial setting value
1	G DRIVE	0 ~ 255	128
2	B DRIVE	0 ~ 255	128

3.6.6 RF AFC CHK MODE [DO NOT ADJUST]

No.	Setting item	Variable range	Initial setting value
1	RF AFC	ON / OFF	ON
2	FINE	-77 ~ +77	Display factory setting value

3.7 ADJUSTMENTS PROCEDURE

3.7.1 B1 POWER SUPPLY VOLTAGE CHECK

Item	Measuring instrument	Test point	Adjustment part	Description
B1 POWER SUPPLY check	DC voltmeter	TP-91 (B1) TP-E		(1) Receive the black-and-white signal. (2) Connect the DC voltmeter to TP-91 (B1) and TP-E. (3) Confirm that the voltage is DC134V.

3.7.2 TUNER CIRCUIT / FOCUS

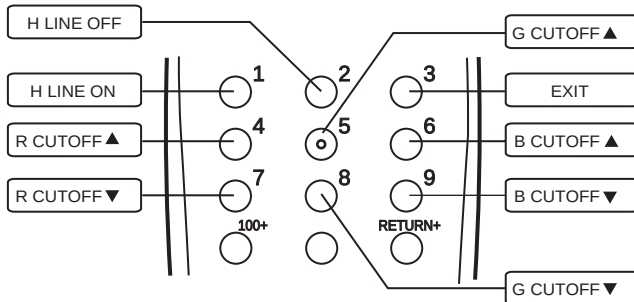
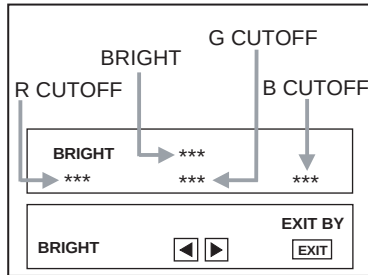
Item	Measuring instrument	Test point	Adjustment part	Description				
IF VCO	Remote control unit		[VCO(CW)] CW transf. (T131)	Under normal conditions, no adjustment is required. (1) Receive the NTSC broadcast (use channels without offset frequency). (2) Select the VCO(CW) mode from the SERVICE MENU. (3) Change [AFC] to OFF and [FINE] to 0. (4) Confirm the color change (yellow) from [TOO HIGH] to [TOO LOW] by CW transf., and [SYNC] is [YES] being shown on the screen. Then, adjust CW transf. until [BELOW REFERENCE] letters turns yellow and confirm again [SYNC] is [YES]. (5) It returns the [AFC] to ON.				
TOO HIGH ABOVE REFERENCE BELOW REFERENCE TOO LOW SYNC : YES EXIT BY EXIT ← YELLOW								
RF AGC	Remote control unit		[PICTURE] <19. RF AGC>	(1) Receive the broadcast. (2) Select <19. RF AGC> of the PICTURE mode. (3) Press the [MUTING] key and turn the color off. (4) Get the noise in the screen with the [VOLUME (-)] key (0 side of setting value). (5) Press the [VOLUME (+)] key, and stop when noise disappears in the screen. (6) Change to other channels and make sure that there is no irregularity. (7) Press the [MUTING] key and get the color.				
<table><tr><th>Setting item</th><th>Initial setting value</th></tr><tr><td>19. RF AGC</td><td>40</td></tr></table>				Setting item	Initial setting value	19. RF AGC	40	
Setting item	Initial setting value							
19. RF AGC	40							
FOCUS	Signal generator Remote control unit		FOCUS VR [In HVT]	(1) Receive the crosshatch signal. (2) While looking at the screen, adjust FOCUS VR so that the vertical and horizontal lines will be clear and in fine detail. (3) Make sure that the picture is in focus even when the screen gets darkened.				

3.7.3 DEFLECTION CIRCUIT

Item	Measuring instrument	Test point	Adjustment part	Description				
V. SIZE	Signal generator Remote control unit		[PICTURE] <13. V SIZE>	(1) Receive the crosshatch signal. (2) Select <13. V SIZE> of the PICTURE mode. (3) Set the initial setting value of <13 V SIZE>. (4) Adjust <13. V SIZE> until the vertical screen size is 92%.				
Screen size 92% Picture size 100% <table><tr><td>Setting item</td><td>Initial setting value</td></tr><tr><td>13. V SIZE</td><td>38</td></tr></table>				Setting item	Initial setting value	13. V SIZE	38	
Setting item	Initial setting value							
13. V SIZE	38							
H. POSITION	Signal generator Remote control unit		[PICTURE] <15. H POS>	(1) Receive the crosshatch signal. (2) Select the <15. H POS> of the PICTURE mode. (3) Set the initial setting value of the <15 H POS>. (4) Adjust the <15. H POS> until the screen will be horizontally centered.				
<table><tr><td>Setting item</td><td>Initial setting value</td></tr><tr><td>15. H POS</td><td>20</td></tr></table>				Setting item	Initial setting value	15. H POS	20	
Setting item	Initial setting value							
15. H POS	20							

3.7.4 WHITE BALANCE

Item	Measuring instrument	Test point	Adjustment part	Description
WHITE BALANCE (Low Light)	Signal generator		[PICTURE] <1. BRIGHT>	(1) Receive the black-and-white signal (color off). (2) Select <1. BRIGHT> of the PICTURE mode. (3) Set the initial setting value of the <1 BRIGHT>. (4) Select the [LOW LIGHT] mode from SERVICE MENU. (5) Set the initial setting value of <R CUTOFF>, <G CUTOFF> and <B CUTOFF> with from [4] to [9] keys. (6) Show the single horizontal line by pressing the [1] key. (7) Turn the SCREEN VR all the way to the left. (8) Turn the SCREEN VR gradually to the right from the left until either one of the red, blue or green colors appears faintly. (9) Adjust the two colors which did not appear until the single horizontal line that is displayed becomes white using the [4] to [9] keys. (10) Turn the SCREEN VR to where the single horizontal line glows faintly. (11) Press the [2] key to return to the regular screen. (12) Press the [3] key to exit from the WHITE BALANCE mode.
	Remote control unit		[LOW LIGHT] <R CUTOFF> <G CUTOFF> <B CUTOFF> SCREEN VR [In HVT]	



Setting item	Initial setting value
R CUTOFF	20
G CUTOFF	20
B CUTOFF	20

Item	Measuring instrument	Test point	Adjustment part	Description					
WHITE BALANCE (High Light)	Signal generator Remote control unit		[HIGH LIGHT] <G DRIVE> <B DRIVE>	(1) Receive the black-and-white signal (color off). (2) Select the HIGH LIGHT mode of the SERVICE MENU. (3) Set the initial setting value of <G DRIVE> and <B DRIVE> with the [5], [6], [8] and [9] keys. (4) Adjust the screen until it becomes white using the [5], [6], [8] and [9] keys. (5) Press the [3] key to exit from the WHITE BALANCE mode.					
G DRIVE B DRIVE HIGH LIGHT *** *** EXIT BY EXIT G DRIVE ▲ G DRIVE ▼ 1 2 3 4 5 6 7 8 9 100+ RETURN+ EXIT B DRIVE ▲ B DRIVE ▼ <table><tr><td>Setting item</td><td>Initial setting value</td></tr><tr><td>G DRIVE</td><td>128</td></tr><tr><td>B DRIVE</td><td>128</td></tr></table>				Setting item	Initial setting value	G DRIVE	128	B DRIVE	128
Setting item	Initial setting value								
G DRIVE	128								
B DRIVE	128								

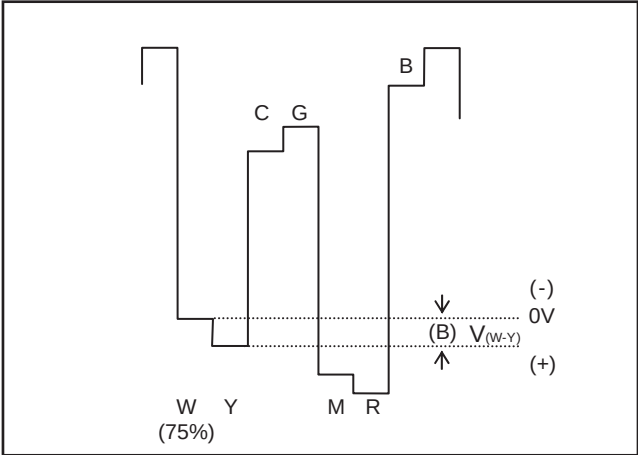
3.7.5 VIDEO CIRCUIT

Item	Measuring instrument	Test point	Adjustment part	Description				
SUB BRIGHT	Remote control unit		[PICTURE] <1. BRIGHT>	(1) Receive the broadcast. (2) Select <1. BRIGHT> of the PICTURE mode. (3) Set the initial setting value of the <1 BRIGHT>. (4) If the brightness is not best with the initial setting value, make fine adjustment of the <1 BRIGHT> until you get the optimum brightness.				
<table><tr><td>Setting item</td><td>Initial setting value</td></tr><tr><td>1. BRIGHT</td><td>64</td></tr></table>				Setting item	Initial setting value	1. BRIGHT	64	
Setting item	Initial setting value							
1. BRIGHT	64							

Item	Measuring instrument	Test point	Adjustment part	Description			
SUB CONTRAST	Remote control unit		[PICTURE] <2. PICTURE>	(1) Receive the broadcast. (2) Select <2. PICTURE> of the PICTURE mode. (3) Set the initial setting value of the <2. PICTURE>. (4) If the contrast is not best with the initial setting value, make fine adjustment of the <2. PICTURE> until you get the optimum contrast.			
	<table><tr><th>Setting item</th><th>Initial setting value</th></tr><tr><td>2. PICTURE</td><td>95</td></tr></table>				Setting item	Initial setting value	2. PICTURE
Setting item	Initial setting value						
2. PICTURE	95						
SUB COLOR	Signal generator Oscilloscope Remote control unit	TP-R TP-E [CRT SOCKET PWB]	[PICTURE] <6. COLOR>	[Method of adjustment without measuring instrument] (1) Receive the broadcast. (2) Select <6. COLOR> of the PICTURE mode. (3) Set the initial setting value of the <6. COLOR>. (4) If the color is not best with the initial setting value, make fine adjustment of the <6. COLOR> until you get the optimum color.			
	<table><tr><th>Setting item</th><th>Initial setting value</th></tr><tr><td>6. COLOR</td><td>48</td></tr></table> 			Setting item	Initial setting value	6. COLOR	48
Setting item	Initial setting value						
6. COLOR	48						

Item	Measuring instrument	Test point	Adjustment part	Description
SUB TINT	Signal generator	TP-R TP-E [CRT SOCKET PWB]	[PICTURE] <5. TINT>	[Method of adjustment without measuring instrument] (1) Receive the broadcast. (2) Select <5. TINT> of the PICTURE mode. (3) Set the initial setting value of the <5. TINT>. (4) If the tint is not best with the initial setting value, make fine adjustment of the <5. TINT> until you get the optimum color.
	Oscilloscope Remote control unit			[Method of adjustment using measuring instrument] (1) Receive the full field color bar signal (75% white). (2) Select <5. TINT> of the PICTURE mode. (3) Set the initial setting value of the <5. TINT>. (4) Connect the oscilloscope between TP-R and TP-E. (5) Adjust <5. TINT> and bring the value of (A) in the illustration to +13V.

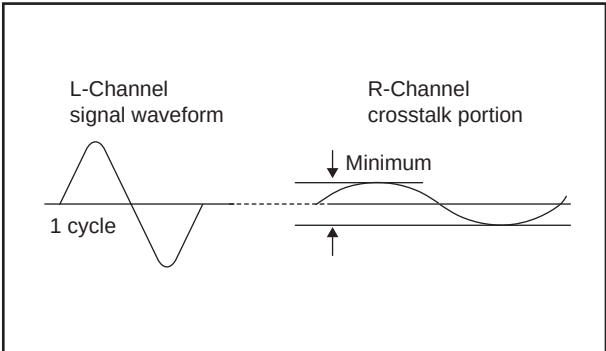
Setting item	Initial setting value
5. TINT	70



3.7.6 MTS CIRCUIT

Item	Measuring instrument	Test point	Adjustment part	Description
MTS INPUT LEVEL	Remote control unit		[SOUND] <1. IN LEVEL>	(1) Select the <1. IN LEVEL> of the SOUND mode. (2) Verify that the <1. IN LEVEL> is set at its initial setting value.
			<table><tr><td>Setting item</td><td>Initial setting value</td></tr><tr><td>1. IN LEVEL</td><td>14</td></tr></table>	
Setting item	Initial setting value			
1. IN LEVEL	14			

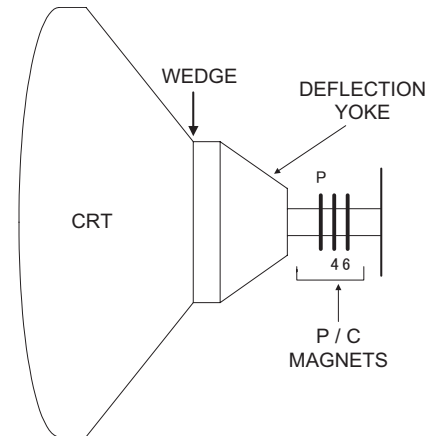
Item	Measuring instrument	Test point	Adjustment part	Description					
MTS STEREO VCO	Signal generator	R OUT [AUDIO OUT]	[SOUND] <2. FH MON> <3. ST VCO>	(1) Receive the RF signal (no modulated sound signal) from the antenna terminal. (2) Select the <2. FH MON> of SOUND mode, and change the setting value from 0 to 1. (3) Connect the frequency counter to R OUT of the AUDIO OUT. (4) Select the <3. ST VCO>. (5) Set the initial setting value of the <3. ST VCO>. (6) Adjust the <3. ST VCO> so that the frequency counter will display 15.73kHz±0.1kHz. (7) Select the <2. FH MON> of the SOUND mode, and reset the setting value from 1 to 0.					
	Frequency counter								
	Remote control unit								
	<table><tr><td>Setting item</td><td>Initial setting value</td></tr><tr><td>2. FH MON</td><td>0</td></tr><tr><td>3. ST VCO</td><td>38</td></tr></table>				Setting item	Initial setting value	2. FH MON	0	3. ST VCO
Setting item	Initial setting value								
2. FH MON	0								
3. ST VCO	38								
MTS SAP VCO	Signal generator	MPX Connector 4pin SDA 3pin GND R OUT [AUDIO OUT]	[SOUND] <8. 5FH MON> <9. SAP VCO>	(1) Receive the RF signal (non modulated sound signal) from the antenna terminal. (2) Connect the 1M ohm resistor between the pin [4] and pin [3] of MPX connector. (3) Select the <8. 5FH MON> of the SOUND mode, and reset the setting value from 0 to 1. (4) Connect the frequency counter to R out of the AUDIO OUT. (5) Select the <9. SAP VCO>. (6) Set the initial setting value of <9 SAP VCO>. (7) Adjust the <9. SAP VCO> so that the frequency counter will display 78.67kHz±0.5kHz. (8) Select the <8. 5FH MON> of the SOUND mode, and reset the setting value from 1 to 0.					
	Frequency counter								
	Remote control unit								
	Resistor [1M ohm]								
<table><tr><td>Setting item</td><td>Initial setting value</td></tr><tr><td>8. 5FH MON</td><td>0</td></tr><tr><td>9. SAP VCO</td><td>40</td></tr></table>			Setting item	Initial setting value	8. 5FH MON	0	9. SAP VCO	40	
Setting item	Initial setting value								
8. 5FH MON	0								
9. SAP VCO	40								
MTS FILTER check	Remote control unit		[SOUND] <5. FILTER>	(1) Select the <5. FILTER> of the SOUND mode. (2) Verify that the <5. FILTER> is set at its initial setting value.					
	<table><tr><td>Setting item</td><td>Initial setting value</td></tr><tr><td>5. FILTER</td><td>35</td></tr></table>				Setting item	Initial setting value	5. FILTER	35	
Setting item	Initial setting value								
5. FILTER	35								

Item	Measuring instrument	Test point	Adjustment part	Description						
MTS SEPARATION	TV audio multiplex signal generator	L OUT R OUT [AUDIO OUT]	[SOUND] <6. LOW SEP> <7. HI SEP>	(1) Input a stereo L signal (300Hz) from the TV audio multiplex signal generator to the antenna terminal. (2) Connect an oscilloscope to L OUT of the AUDIO OUT, and display one cycle portion of the 300Hz signal. (3) Change the connection of the oscilloscope to R OUT of the AUDIO OUT, and enlarge the voltage axis. (4) Select the <6. LOW SEP> of the SOUND mode. (5) Set the initial setting value of the <6. LOW SEP>. (6) Adjust the <6. LOW SEP> so that the wave element of the 300Hz signal will become minimum. (7) Change the signal to 3kHz, and similarly adjust the <7. HI SEP>.						
	Oscilloscope				Remote control unit					
L-Channel signal waveform R-Channel crosstalk portion  <table><tr><th>Setting item</th><th>Initial setting value</th></tr><tr><td>6. LOW SEP</td><td>10</td></tr><tr><td>7. HI SEP</td><td>9</td></tr></table>					Setting item	Initial setting value	6. LOW SEP	10	7. HI SEP	9
Setting item	Initial setting value									
6. LOW SEP	10									
7. HI SEP	9									

3.7.7 PURITY AND CONVERGENCE

PURITY ADJUSTMENT

- (1) Demagnetize CRT with the demagnetizer.
- (2) Loosen the retainer screw of the deflection yoke.
- (3) Remove the wedges.
- (4) Input a green raster signal from the signal generator, and turn the screen to green raster.
- (5) Move the deflection yoke backward.
- (6) Bring the long lug of the purity magnets on the short lug and position them horizontally. (Fig.2)
- (7) Adjust the gap between two lugs so that the GREEN RASTER will come into the center of the screen. (Fig.3)
- (8) Move the deflection yoke forward, and fix the position of the deflection yoke so that the whole screen will become green.
- (9) Insert the wedge to the top side of the deflection yoke so that it will not move.
- (10) Input a crosshatch signal.
- (11) Verify that the screen is horizontal.
- (12) Input red and blue raster signals, and make sure that purity is properly adjusted.



P/C MAGNETS

P : PURITY MAGNET
4 : 4 POLES (convergence magnets)
6 : 6 POLES (convergence magnets)

Fig.1

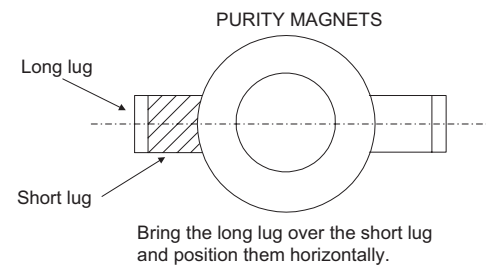


Fig.2

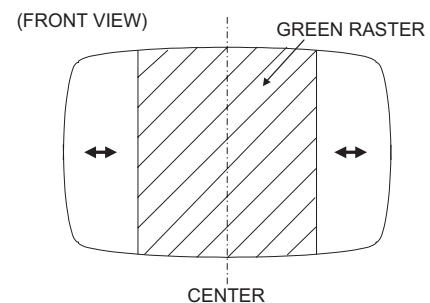


Fig.3

STATIC CONVERGENCE ADJUSTMENT

- (1) Input a crosshatch signal.
- (2) Using 4-pole convergence magnets, overlap the red and blue lines in the center of the screen (Fig.1) and turn them to magenta (red/blue).
- (3) Using 6-pole convergence magnets, overlap the magenta (red/blue) and green lines in the center of the screen and turn them to white.
- (4) Repeat 2 and 3 above, and make best convergence.

DYNAMIC CONVERGENCE ADJUSTMENT

- (1) Move the deflection yoke up and down and overlap the lines in the periphery. (Fig. 2)
 - (2) Move the deflection yoke left to right and overlap the lines in the periphery. (Fig. 3)
 - (3) Repeat 1 and 2 above, and make best convergence.
- After adjustment, fix the wedge at the original position. Fasten the retainer screw of the deflection yoke. Fix the 6 magnets with glue.

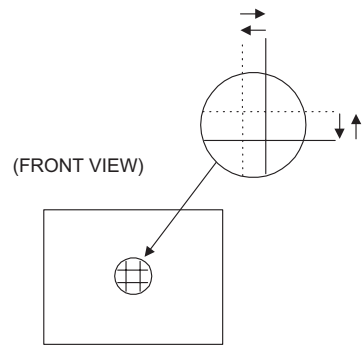


Fig.1

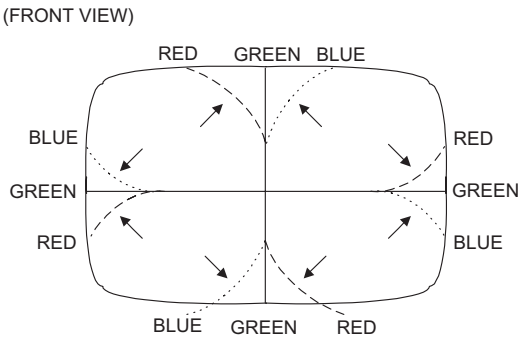


Fig.2

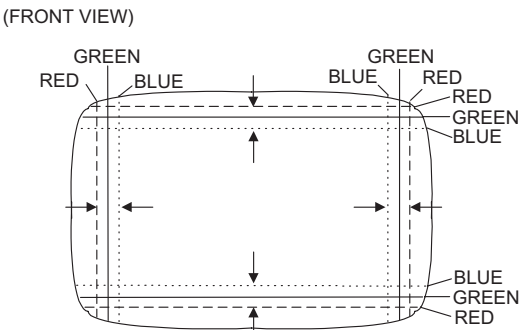


Fig.3

3.7.8 HOW TO CHECK THE HIGH VOLTAGE HOLD DOWN CIRCUIT

3.7.8.1 HIGH VOLTAGE HOLD DOWN CIRCUIT

After repairing the high voltage hold down circuit shown in Fig.1.

This circuit shall be checked to operate correctly.

3.7.8.2 CHECKING OF THE HIGH VOLTAGE HOLD DOWN CIRCUIT

- (1) Turn the power switch to on.
- (2) As shown in Fig. 1, set the resistor between [X] connector [1] and [3].
- (3) Make sure that the screen picture disappears.
- (4) Temporarily unplug the power plug.
- (5) Remove the resistor replaced [X] connector [1] and [3].
- (6) Again plug the power plug, make sure that the normal picture is displayed on the screen.

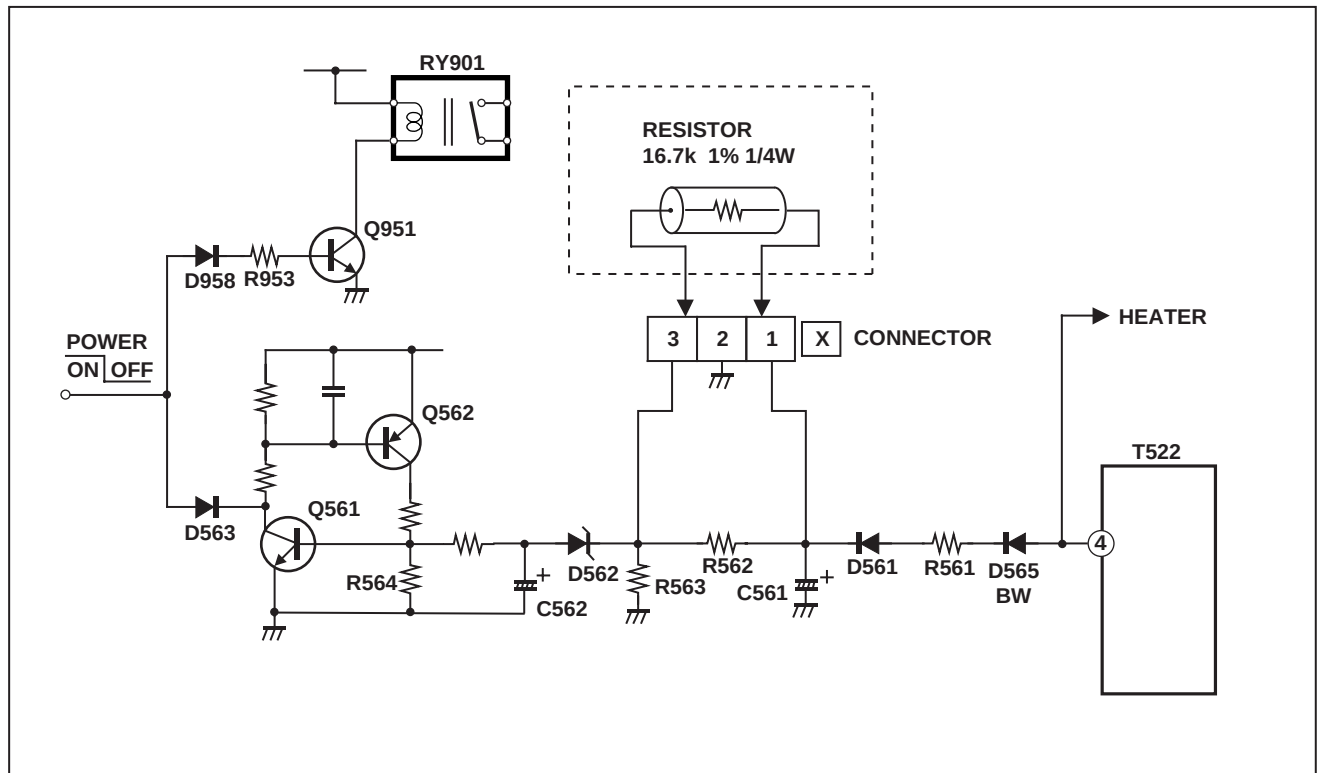


Fig.1

SECTION 4

TROUBLE SHOOTING

4.1 SELF CHECK FUNCTIONS

4.1.1 OUTLINE

This model has self check functions given below. When a malfunction has been detected, the POWER is turned off and the LED flashes to inform of the failure . The malfunction is detected by the signal input state of the control line connected to the microcomputer.

4.1.2 SELF CHECK ITEMS

Check item	Details of detection	Method of detection	State of malfunction
CRT NECK protector [Also detected if the power supply line output from the HVT (High voltage Transformer) has shorted with the ground.]	When the vertical circuit S-correction capacitor C427 is shorted, detect the potential drop of the C427, and prevent the burn damage to the CRT NECK. (Shorting of the power supply output from the HVT to the vertical circuit, and the small signal power supply is also detected.)	The microcomputer detects at 1 second intervals. If NG is detected for more than 1 ms, a malfunction is interpreted.	When a malfunction has been detected, the POWER is turned off. While the POWER is being turned off , the power key of the remote controller is not operational until the power code is taken out and put in again.

4.1.3 SELF CHECK INDICATING FUNCTION

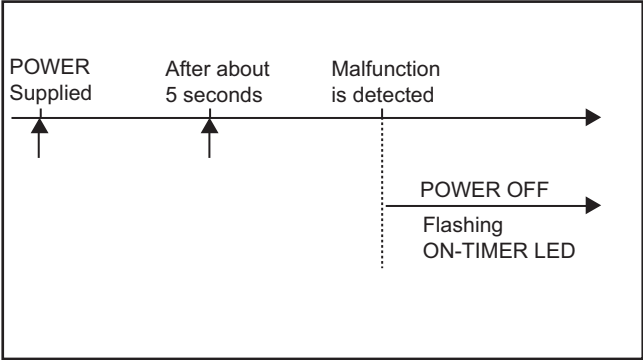
The self-check function begins detection about 5 seconds after power is supplied.

In the event a malfunction is detected, the power is cut off immediately.

At this time, the ON-TIMER LED flashes to inform of the malfunction.

[ON-TIMER LED indication]

The ON-TIMER LED flashes at 0.5 seconds intervals.



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